Alternative D

Through Delta Conveyance

Note: ***See list of Core Actions for additional activities included in this alternative. Some Core Actions are included below when they are to be implemented at higher level.***

Physical and Structural Features

Habitat Restoration

Activities	Benefits

• Restore **shallow water** (tidal) **habitat** in the Delta.
  • Convert 4,000 to 6,000 acres of existing leveed lands to tidal actions.
  • Include shallow water habitat in reconstruction of 50 to 100 miles of levees (coordinate with *Flood Protection and Levee Stabilization* activities).
	• Improves shallow water aquatic habitat.
	• Increases the availability of forage, spawning, and rearing habitats and escape cover for:
	  • juvenile salmon
	  • Delta smelt
	  • splittail
	  • other resident and anadromous fish

• Restore **Delta riparian habitat.**
  • Improve riparian conditions on 500 to 700 acres of degraded riparian lands above the 200 to 400 acres improved through Core Action activities.
  • Establish new areas of riparian habitat through acquisition of 1,000 to 2,000 acres of riparian land.
	• Increases the availability of riparian habitat.
	• Improves the quality of riparian habitat within the Delta.
	• Increases availability of shade and cover habitats for aquatic species.
	• Provides spawning habitat for native and non-native fish.
	• Improves rearing habitat for salmon and other species.

• Restoration of **Delta (non-tidal) wetland habitat.**
  • Protect and enhance 200 to 400 acres of existing wetland habitats above the 100 to 300 acres protected through Core Action activities.
  • Convert 3,000 to 5,000 acres of suitable lands to wetland habitats.
	• Increases the availability of waterfowl and wildlife rearing habitats.

• Restoration of **Delta Terrestrial Habitat.** • Protect and enhance 600 to 1,000 acres of existing upland habitat above the 1,200 to 2,000 acres protected through Core Action activities.	• Improves quality of terrestrial habitat. • Maintains or improves agricultural practices which benefit terrestrial species. • Improves habitat of threatened and endangered species. • Improves wildlife corridors.

Activities	Benefits
• Restoration of **Suisun Bay habitat**. • Restore 1,500 to 2,5000 acres to tidal wetland habitat.	• Provides wet year spawning habitat for Delta smelt • Provides rearing areas for salmon • Provides waterfowl and wildlife habitat (e.g. canvasback and redhead ducks)

• Restore **riverine habitat** on the **Sacramento River** between Verona and Collinsville and along **Delta channels**.
  • Set back levees to restore natural riverine cross sections to 40 to 60 miles of waterways.
  • Reconstruct river banks and shallow water habitat on 75 to 100 miles of leveed banks along the Sacramento River.
  • Protect and enhance 750 to 1,250 acres of riverine habitats on channel islands above the 500 to 1,000 acres protected through Core Action activities.
	• Increases spawning and rearing habitat for:
	  • chinook salmon
	  • Delta smelt
	  • steelhead
	  • splittail
	  • striped bass
	  • other native and non-native fish species
	• Increases availability of riparian-shoreline habitat for forage, escape, and cover areas for the aquatic and terrestrial species.

• Restore **riverine channel features** in the **Sacramento River upstream of the Delta**, including tributaries. • Restore and enhance riparian vegetation on 20 to 40 miles of river upstream of the Delta between Verona and Colusa.	• Increases natural fish productivity. • Improves water quality and water supply reliability from the Sacramento River and its tributaries • Improves food supply availability for fish. • Improves wildlife habitat.

• Restore **riverine channel features** in the **San Joaquin River upstream of the Delta**, including tributaries.
  • Restore channel configurations on 25 to 35 miles of degraded San Joaquin River to:
  • deepen channel, and
  • improve water temperatures.
• **Isolate in-channel gravel quarry areas** from main flows of the San Joaquin River and its tributaries.
	• Increases natural fish productivity.
	• Improves water quality and water supply from the San Joaquin River and its tributaries.
	• Improves (reduces) water temperature.
	• Improves food supply availability for fish.
	• Improves wildlife habitat.
	• Provides more natural river corridor.
	• Protects young fish from predation and straying.

• Restoration of **floodway corridor habitat**
  • Modify floodways to convert 5,000 to 7,000 acres of productive agricultural lands to wetland habitat.
• **Reduce fish stranding** in accordance with *Fish Protection and Transport* actions.
	• Provides spawning areas for Delta native fish.
	• Improves wildlife habitat.
	• Improves forage areas and escape cover for:
	  • juvenile salmon
	  • Delta smelt
	  • splittail
	  • other native and non-native fish species

Considerations
• **Delta Shallow Water Habitat** – Candidate areas restoration include Prospect Island, Liberty Island, Little Holland Tract, Hastings Tract, Yolo Bypass, and the southeast Delta. • **Delta Levee Habitat** – Candidate levees for habitat restoration include Twitchell Island along Threemile Slough and Sevenmile Slough, Georgiana Slough, and the North and South Forks of the Mokelumne River. • **Floodway Corridors** – Habitat restoration must not impair capacity of floodways. • **Suisun Bay** – Create tidal wetlands with dredge spoils between Collinsville and Carquinez Strait or convert diked wetlands to tidal wetlands. • **San Joaquin River** – Feasible and cost-effective habitat restoration and channel modifications. • **Riparian Habitat** – Coordinate with *Flood Protection and Levee Stabilization* actions.

Water Transport

Activities	Benefits
• Construct a **new, 15,000 to 20,000 cfs screened diversion** facility on the Sacramento River upstream of the Delta to divert all export supplies to eastside channels.	• Reduces entrainment effects of existing export facilities on fish. • Offers the capability to provide water supplies to users in the region immediately east of the Delta. • Improves water supply reliability by adding flexibility of a second diversion point upstream of most Delta native fish habitat. • Creates a more efficient method of transferring water to export pumps. • May reduce carriage water losses in critical years thereby benefitting water supply.
• Increase **existing east-side channel flow** capacity to facilitate transport of water through the Delta, in conjunction with *Flood Protection and Levee Stabilization* actions.	• Increases flow routing capability and flexibility. • May improve shaded riverine aquatic habitat along conveyance routes in conjunction with *habitat* actions.

Considerations
• Diversion would be constructed at a location upstream of the Delta such as near Hood or Freeport and sited to minimize intrusion into native fish habitat. • Use best available screening technology on multiple intakes and real-time monitoring to minimize fisheries impacts. • East-side channel improvements would focus on Mokelumne River but also include channels such as Cosumnes River and Deer Creek. • An alternative formulation consisting of a screened diversion near Andrus Island and crossing the island to Georgiana Slough, then across Tyler Island to the Mokelumne River will be investigated. This formulation would include pumped releases at Georgiana Slough that would establish a hydraulic barrier to fish migration.

Water Storage

Activities	Benefits
• Construct **new downstream storage** with approximately 1 million to 1.5 million AF capacity • Construct **groundwater storage** projects in the southern San Joaquin Valley with approximately 500,000 to 1 million AF annual supply.	• Provides additional storage and operational flexibility for supply, quality, and environmental needs • Allows diversions to be reduced during times of greater environmental sensitivity, and increased at times of reduced environmental sensitivity
Considerations	
• Groundwater storage may take the form of in-lieu recharge or direct recharge using injection wells or recharge basins. • A portion of storage will be managed for in-Delta fisheries or other Bay-Delta environmental purposes.	

Fish Protection and Transport

Activities	Benefits

• Develop improvements on **Old River** at the head of Old River to:
  • Block fish movement into Old River.
  • Manage water flows and stages down Old River.
	• Encourages outmigrating salmon to stay in San Joaquin River.
	• Allows management of flows and stage in Old River.
	• Improves water quality in the south Delta.

• Continue to evaluate acoustic barrier at **Delta Cross Channel** to block outmigrating fish from entering the interior Delta.	• Increases fish survival. • Improves operational flexibility of facility.
• Install **fish screens** on moderate and high priority diversions in the Delta, rivers, and tributaries.	• Reduces entrainment of fish throughout the system.
• Improve **fish screening** capability at existing export diversion facilities.	• Reduces entrainment of fish at export facilities.
• Construct a **new screened intake** for the State Water Project at Italian Slough	• Avoids fish predation and entrainment in Clifton Court Forebay when diversion rates are low.
• Improve **floodway drainage** to reduce fish stranding by 30 percent.	• Increases fish survival.
Considerations	
• Select diversions for screening according to criteria including size of intake, location, peril to fish, and screening feasibility. • New intake at Italian Slough is designed to work in conjunction with the existing Clifton Court Forebay intake.	

Flood Protection and Levee Stabilization

Activities	Benefits

• Implement a comprehensive **Delta Long-Term Protection Plan at a moderate level.**
  • For levee maintenance and stabilization actions to attain and maintain a uniform standard at or above the Hazard Mitigation Plan also to include recommended funding to improve 140 to 180 miles of levees currently below the HMP standard.
  • To implement levee improvements and associated habitat improvements along 250 to 290 miles of Delta levees to the Corps P.L. 99 standard based on overall system resource benefits.
	• Reduces vulnerability of Delta land use and infrastructure to inundation.
	• Reduces vulnerability of Delta water quality to salinity intrusion.
	• Reduces vulnerability of Delta ecosystem functions to salinity intrusion and inundation.
	• Provides greater opportunities for habitat restoration.

• **Improve flood conveyance capacity** of Delta channels through channel maintenance actions (e.g. maintenance dredging) or in conjunction with levee upgrades and improvements.	• Reduces vulnerability of Delta functions to inundation. • Improves flood conveyance capacity in high priority channels. • Provides greater opportunities for habitat restoration.

Considerations

- Integrate protection and stabilization of levees with Delta habitat restoration activities.
- Candidate areas for P.L. 99 protection include, but are not limited to Sherman, Jersey, Bouldin, and Lower Roberts islands, and New Hope, Palm, and Lower and Upper Jones tracts.
- Channel improvements may include widening for improved conveyance, stabilizing berms, and related actions, should be integrated with levee improvements.
- Improvements to channels include dredging for sediment removal in channels with restricted flood capacity.
- Evaluate combination of floodway capacity and reservoir flood reservation.

Operational and Management Features

Water Supply Management

Activities	Benefits
• Encourage temporary **land fallowing** during drought periods to reduce dry year demand by approximately 300,000 to 500,000 AF through use of incentives and other programs. • Permanently **retire** approximately 300,000 to 400,000 acres of marginally producing **agricultural lands** and lands from willing sellers through use of incentives and land purchases.	• Reduced demand for Delta water exports. • Could make water available for transfers. • Provides water quality benefits in the San Joaquin River and south Delta by retiring lands that contribute to drainage problems along the San Joaquin River. • Reduces slightly the total salt load to the San Joaquin Valley.
• Expand **groundwater banking and conjunctive use** in Delta export areas such as the San Joaquin Valley and the Tulare Lake Basin to provide an annual yield of 300,000 to 500,000 AF and integrate with surface storage.	• Improves operational flexibility of Delta exports. • Allows a portion of Delta exports to be shifted away from fish sensitive periods. • Reduces fish entrainment at Delta pumping facilities.

• Increase the implementation of **municipal and industrial water conservation** to reduce demand by 200,000 to 300,000 AF over current implementation commitments.
  • Use incentives or other means to achieve implementation of Best Management Practices (BMP's) by more suppliers and water users.
  • Expand the BMP's to include additional practices and higher implementation rates.
• Increase the level of **agricultural water conservation** to reduce demand by an additional 200,000 to 400,000 AF.
  • Use incentives or other means to achieve implementation of Efficient Water Management Practices (EWMP's) by more suppliers and water users.
  • Expand the EWMP's to include additional practices.
	• Reduces overall water demand.
	• Could make water available for transfers.
	• May improve overall Delta and tributary water quality through retention of agricultural drainage water for release when pulse flows can provide dilution.

Activities	Benefits
• Implement **urban wastewater reclamation** programs to develop approximately 300,000 to 700,000 AF of additional water supply. Reclamation projects could include: recharging groundwater, using for agricultural irrigation, recycling and treating for potable or non-potable urban use, use of grey water, and storage for use in meeting X2 standards. • Treat and **recycle agricultural drainage** for irrigation purposes to reduce export demand where feasible while maintaining appropriate salt leaching requirements.	• Reduces demand for Delta water exports. • Could make water available for transfer. • Can improve Delta and San Joaquin River and export water quality depending on reclamation activity.
• Develop an incentive driven program to modify **upstream reservoir releases** on all tributaries to maximize coordination with water quality, fish and wildlife, and water supply needs.	• Improves flexibility of system operations. • Increases water supply reliability.

Considerations

- Emphasis for land retirement will be placed on land which contributes to regional drainage problems and/or is marginally productive. In-Delta land retirement can reduce diversion effects, assist with actions to control subsidence, and improve water quality.
- Maximize the potential for temporary fallowing (such as rotational fallowing). Land fallowing upstream of the Delta may reduce Delta inflows and may also be available for use in water transfers.
- Reclamation and reuse programs would focus on facilities that currently discharge treated wastewater to salt sinks or other degraded bodies of water which are not reusable.
- Conjunctive use and groundwater storage programs can include in-lieu operations which focus on providing adequate deliveries of surface water in wet years and lower deliveries in dry years. Groundwater stored south of the Delta would be used in-lieu of surface deliveries during dry years and seasonally to marginally offset Delta exports during fish sensitive periods.
- Agricultural conservation values shown only include conservation of water lost to salt sinks or other degraded bodies of water which are not reusable.

Water Diversion Management

Activities	Benefits
• **Acquire about 100,000 AF** of water from willing sellers in the San Joaquin Valley or develop from expanded surface water or groundwater storage.	• Transports fish through the San Joaquin River and Delta. • Improves water quality. • Improves management flexibility for diversions to reduce fish losses.

Activities	Benefits
• **Improve CVP and SWP operations** through predation control and coordinating operations.	• Reduces fish losses. • Improves CVP/SWP coordinated operations to include "joint point of diversions and use." Allows water pumped by either project to be used by both projects.
• **Improve fish salvage** procedures using best available technology.	• Reduces fish take at the CVP/SWP pumping facilities.
• Improve **real-time monitoring** for presence of fish species of special concern and modify water diversions to avoid fish entrainment.	• Provides an additional tool to help reduce entrainment of special-concern species. • Improves flexibility to divert water during critical fish migration periods.
• **Expand permitted pumping capacity** of the CVP and SWP south Delta facilities to their full physical capacity during windows when fish are less vulnerable to pumping effects (e.g., late Fall to early Winter).	• Increase operational flexibility of Delta exports. • Reduce pumping effects on aquatic species of special concern. • Improves ability to ensure water supply reliability and predictability. • Increase yield both from the Delta and from upstream reservoirs due to reoperation practices and shifted Delta exports.

Considerations

- Increased pumping capacity at CVP/SWP south Delta facilities will be guided by real-time monitoring programs.

San Joaquin environmental water can be used for pulse flows for fish transport or diluting poor quality flows.

- Improve CVP/SWP coordinated operations to include "joint point of diversion and use". Allows water pumped by either project to be used by both project users.
- Investigate the feasibility of wheeling and exchanging water to augment San Joaquin River flows.

Fisheries Management

Activities	Benefits
• **Mark salmon** produced in hatcheries.	• Facilitates selective catch of hatchery salmon by commercial and recreational fisheries.
• Conduct **net-pen rearing of striped bass** for about 100,000 fish to supplant natural production.	• Maintains recreational fishery. • Reduces operational constraints on water diversions.

Considerations

- Actions are intended to maintain recreational and commercial fisheries as well as enhance native salmon stocks.
- Need to assess impact of incidental mortality on native (unmarked) fish.

Water Quality Management

Activities	Benefits
• **Manage drainage timing** (i.e. restrict drainage discharges by 20 to 30 percent during periods of low Delta inflow) to reduce instream impacts to water quality.	• Reduces the concentration of pollutants entering the Delta and its tributaries during low flow periods and allows better coordination of discharges and dilution flows.
• Improve **management of urban stormwater runoff** to retain an additional 20 to 30 percent of runoff volume contained presently.	• Improves Delta water quality by reducing the volume of urban stormwater runoff and concentration of pollutants entering Delta tributaries.
• **Construct wetlands** to treat 10,000 to 15,000 AF of upstream wastewater effluent and Delta agricultural drainage.	• Improves Delta water quality by allowing some filtration and reduction in biological oxygen demand to result from constructed wetland treatment.

• Increase enforcement of source control regulations for **agricultural drainage** to moderately:
  • Reduce leachate concentrations and volumes.
  • Restrict spray programs adjacent to waterways.
  • Reduce runoff volumes.
  • Reduce the concentrations of pollutants in runoff.
	• Reduces in-Delta and tributary surface water concentrations of pesticides (herbicides, fumigants, fungicides), fertilizers, concentrated mineral salts, and microbial agents from agricultural drainage.

• Coordinate incentives for developing **efficient water management practices** with *Water Supply Management* actions.	• Improves overall Delta and tributary water quality by more efficient management and therefore reduced applications of water and chemicals.
• Coordinate **fallowing or retirement** of agricultural lands with severe, costly drainage problems with *Water Supply Management* actions.	• Reduces volume of drainage water and constituent pollutant contributions to Delta and tributary surface waters.
• Provide **incentives for filtration system upgrades or watershed protection program development** to improve source drinking water quality to meet EPA Drinking Water Quality Standards. Prioritize targeted recipients using criteria that includes, but is not limited to, number of service connections and upgrade costs needed to meet Maximum Contaminant Level Goals.	• Improves source drinking water quality. • Directs funding to highest priority needs.
• Provide incentives for **phased conversion of municipal treatment facilities** from processes resulting in high disinfection byproduct precursor discharges to processes that do not produce DBP's.	• Reduces concentration of compounds contributing to trihalomethane formation potential and degradation to drinking water supplies.
• Implement moderate on-site **mine drainage remediation** measures developed in site specific studies at the Walker Mine, Malakoff Diggins, Leviathon Mine, Iron Mountain Mine and Penn Mine sites, and control runoff from those and other high priority mine sites based on current water quality objectives for pollutants.	• Reduces future Delta and Sacramento River heavy metals loading.

Considerations
• Retire lands that directly contribute to degraded water quality conditions in the Delta and its tributaries.
• Prioritize agricultural drainage sites for drainage management, such as west-side of San Joaquin Valley, Panoche Creek area, etc.
• Evaluate potential to give urban areas flexibility to fund high priority mine remediation in-lieu of increasing expenditures on treatment plant improvements.
• Evaluate the feasibility of developing additional water suppliers on the San Joaquin River for water quality dilution.
• Wetlands treatment will be initiated as a "pilot program" to establish its feasibility and expanded appropriately.

Management of System Vulnerability

Activities	Benefits
• Establish **landside buffer zones** adjacent to some levees on islands with deep peat soils.	• Buffer zones provide an increase in stability of adjacent levees. • Conversion to wetlands provides long-term increases in stability of Delta levees and reliability of Delta functions by reversing subsidence.
• Establish and recommend modest funding for an **emergency levee management program** which provides funding and direction for reclaiming Delta islands in the event of levee failures and for the continued protection of Delta functions. • Identify funding sources for **continuing levee maintenance** activities beyond the planning horizon of this program. • Identify funding sources for a **continuing levee stabilization program** that will work beyond the planning horizon of this program towards improving all important Delta levees to a P.L. 99 standard.	• Ensures suitable funding, equipment and materials availability, and coordination to rapidly respond to levee failures. • Provides funding for continued maintenance of levees to protect Delta functions. • Increases the reliability for water supply needs from the Delta.

Considerations
• Determine extent and cost effectiveness of levee improvements and buffer zone programs.
• Buffer zones may be managed to provide wildlife habitat.
• Candidate islands for subsidence control include, but are not limited to Grand, Twitchell, Sherman, Andrus, and Bouldin.
• Emergency levee management program would not replace other levee maintenance or improvement programs.
• Levee maintenance funding would be based upon continuation, possibly at a slightly higher level, of a program like the SB 34 program, which currently funds maintenance activities. SB 34 is set to expire in 1997.

Institutional and Policy Features

Habitat Programs

Activities	Benefits
• Integrate recommended **habitat restoration actions from other federal and state programs**, including the Anadromous Fish Restoration Program.	• Provides additional habitat restoration. • Provides coordination between habitat restoration programs.
• Establish a CALFED Regulatory Team to coordinate and **expedite habitat restoration permits**.	• Accelerates acquisition of permits for environmental restoration projects and other CALFED projects.
• Establish a program to identify and use clean **dredge materials** from the Delta for habitat restoration and levee maintenance in the Delta.	• Provides materials for habitat and levee improvements
• Encourage and provide incentives for farmers and levee maintenance districts to **leave habitat areas undisturbed** through working with resource agencies.	• Protects existing habitats. • Increases flexibility in maintenance programs.
Considerations	
• Coordinate activities to avoid duplication. • CALFED Regulatory Team would be comprised of key personnel from each CALFED member agency.	

Water Quality Protection

Activities	Benefits
• Increase enforcement of source control regulations for **urban and industrial runoff**.	• Improves Delta water quality by enforcing real economic penalties for discharge violations.
• Coordinate with on-going or planned **watershed management programs** that promote and protect Delta water quality and fishery benefits.	• Increases level of protection of Delta water quality and in-Delta and anadromous fish habitats.
Considerations	
• Prioritize sources and pollutants of concern and direct enforcement activities accordingly. • Coordination with other watershed management programs could include programs outside of CALFED's geographic scope.	

Water Supply Management

Activities	Benefits
• Establish **incentives for long-term conjunctive use** in the Sacramento and San Joaquin valleys and ease institutional barriers.	• Reduces dry year demand for Delta water exports. • Could make water available for transfers.
• **Long-term planning for drought contingencies.** • Create a coordinated CALFED program to expedite and expand the use of **water transfers** to meet water needs during droughts.	• Improve drought response planning. • Increases water supply reliability. • Can be integrated with conjunctive use programs.
• Ease **institutional barriers** to facilitate water transfers. • Improve **planning and coordination** procedures for water transfers. • Improve **operational procedures** to facilitate water transfers. • Establish a water transfer **brokering mechanism** or institution.	• Increases the efficiency of implementing water transfers. • Increases financial position of otherwise economically marginal projects that increase water supply flexibility. • Increases water supply reliability, predictability, and flexibility.

• Improve coordination of **land use and water supply planning.**
  • Develop incentives for local and regional coordination of land use and water supply planning.
  • Implement long-term institutional measures to increase coordination of state/federal project planning and operations with local and regional project planning and operation.
	• Provides greater flexibility for short-term transfer water during drought contingencies.
	• Increases the efficiency of water supply planning.
	• Ensures beneficial uses of existing water supplies.

Considerations
• Determine institutional needs to implement long-term drought planning programs. • Determine institutional requirements for augmenting California Water Codes to facilitate water transfer procedures. • Evaluate the use of a Delta central planning institution to manage inflows, transfers, export operations, and outflows.